REMARKS

Claims 1-4, 6-13 and 15-18 are pending in the application, of which claims 1, 3, 8, 11 and 16 have been amended, and claims 19 and 20 newly added, in order to more particularly point out, and distinctly claim the subject matter to which the applicants regard as their invention.

Objection to the Drawings

The drawings are objected to under 37 CFR §1.83(a).

Specifically, the Examiner is objecting to claim 3 in which the ridge portion is claimed as comprising a second p-type cladding layer. A part of p-AlGaN cladding layer 7 constitutes a ridge portion in the embodiment of Fig. 1. That is, p-AlGaN cladding layer 7 is included in the first nitride based semiconductor layer and the ridge portion. Claim 3 is amended to reflect this feature. Therefore, withdrawal of the objection to claim 3 is respectfully requested.

Further, the Examiner objects to claim 10 in which the current blocking layer is claimed as having a multi-layer structure. The current blocking layer having a multi-layer structure is described on page 29, line 21 to page 30, line 25 of the specification. Therefore, withdrawal of the objection to claim 10 is respectfully requested.

Objections to the Claims

Claims 8 and 16 are objected to because of informalities. Specifically, the Examiner is

objecting to the electrode not being identified as an n-type or p-type electrode. Taking the Examiner's comments into consideration claims 8 and 16 have been amended. Therefore, withdrawal of the objection to claims 8 and 16 is respectfully requested.

Claim Rejections under 35 USC §102

Claims 1-4, 9, 11, 13 and 17 are rejected under 35 USC §102(e) as being anticipated by Kunisato et al. (U.S. Patent No. 6,162,656).

The present invention provides for an AlGaN cladding layer (7), a first GaN layer (8), covered by a current blocking layer (9). An opening (W_1) is provided in the current blocking layer (9) which is significantly smaller than the width (W_2) of the first GaN layer (8). As shown in Figure 2 and discussed on page 21, lines 5-16 of the specification the ratio of W_2 / W_1 is between 0.1 and 0.95 and preferably between 0.1 and 0.8. Further, a second GaN layer (10) is provided on top of the current blocking layer (9).

Kunisato et al. describes a nitirde semiconductor laser. As illustrated in Figure 4, formed on a sapphire insulating substrate (31) are an undoped AlGaN buffer layer (32), an undoped GaN underlayer (33), an n-type GaN contact layer (34), and an n-type AlGaN cladding layer (35). Formed on the n-type AlGaN cladding layer (35) are an InGaN active layer (36), an undoped GaN cap layer (37), and a p-type AlGaN cladding layer (38). The p-type AlGaN cladding layer (38) has a flat region and a ridge region formed in the center of the flat region. A p-type GaN cap layer (39) is formed on the ridge region of the p-type AlGaN cladding layer (38). An n-type GaN

or n-type AlGaN current blocking layer (40) is formed on the upper surface of the flat region and the side surfaces of the ridge region of the p-type AlGaN cladding layer (38) and on the side surfaces of the p-type cap layer (39). A p-type GaN contact layer (41) is formed on the p-type cap layer (39) and the n-type current blocking layer (40). A p-type electrode (42) is formed on the p-type GaN contact layer (41) and an n-type electrode (43) is formed on the n-type GaN contact layer 34.

In the semiconductor laser device of Fig. 4 of Kunisato et al. (U.S. Patent No 6,162,656), since the side surfaces of the ridge portion are inclined, the distance between n-type GaN or n-type AlGaN current blocking layer 40 on side surfaces is smaller than the width of the upper surface of p-type AlGaN cladding layer 38.

The Examiner seems to consider that p-type AlGaN cladding layer 38 of Kunisato et al. corresponds to the ridge portion of the present invention, and p-type GaN cap layer 39 of Kunisato et al. corresponds to the second nitride based semiconductor layer of the present invention.

In the embodiment of the present application, a part of p-AlGaN cladding layer 7 of Fig. 1 and p-first GaN cap layer 8 constitute the ridge portion, and the p-second GaN cap layer 10 corresponds to the second nitride based semiconductor layer.

Applicants have amended claims 1 and 11 in order to clarify the differences between the present invention and that of Kunisato et al.

The Examiner asserts that MOCVD is a traverse growth technique. The applicant

believes that this is a misunderstanding on the Examiner's part. The growth in the traverse direction occurs in the case where high melting point metal such as tungsten or insulator is used for a mask in MOCVD or HVPE. The nitride based semiconductor is grown upwards from the portion on which the mask does not exist, and further grown in the traverse direction above the mask.

In the embodiment of Fig. 1 of the present application, current blocking layer 40 forms an overhang above the ridge portion by using a traverse growth technique in MOCVD.

In Fig. 4 of Kunisato et al., current blocking layer 40 is grown by MOCVD, but there is no description of the use of a traverse growth technique, and current blocking layer 40 of Fig. 4 has no overhang portion.

For the reasons above, Applicants do not believe that the present invention would have been anticipated be obvious over Kunisato et al.

Therefore, independent claims 1 and 11 patentably distinguish over the prior art relied upon by reciting, as exemplified by claim 1,

> "A semiconductor laser device comprising: a first nitride based semiconductor layer including a light emitting layer and containing at least one of indium, gallium, aluminum, boron and thallium; a ridge portion formed in a region having a predetermined width on said first nitride based semiconductor layer, having an upper surface having a first width and a side surface, and containing at least one of indium gallium, aluminum, boron and thallium; a current blocking layer formed on said first nitride based semiconductor layer and on a region from the side surface of said ridge portion to the upper surface thereof so as to be in contact with a part of the top surface of said ridge portion by a transverse growth technique, and having an opening having a second width smaller than said first width on the upper surface of said ridge portion; and a second nitride based semiconductor layer formed on the upper surface of said

ridge portion in said opening and containing at least one of indium, gallium, aluminum, boron and thallium." (Emphasis Added)

Therefore, withdrawal of the rejection of Claims 1-4, 9, 11, 13 and 17 under 35 USC §102(e) as being anticipated by Kunisato et al. (U.S. Patent No. 6,162,656) is respectfully requested.

Claim Rejections under 35 USC §103

Claims 6 and 12 are rejected under 35 USC §103(a) as being unpatentable over Kunisato et al. (U.S. Patent No. 6,162,656) as applied to claims 1 and 2 above, and further in view of Sugiura et al. (U.S. Patent No. 5,932,896).

Sugiura et al. describes a semiconductor device in which the current blocking layer is composed of indium and gallium.

Claims 6 and 12 are allowable by virtue of their dependence from allowable independent claims. Therefore, withdrawal of the rejection of Claims 6 and 12 under 35 USC §103(a) as being unpatentable over Kunisato et al. (U.S. Patent No. 6,162,656) and further in view of Sugiura et al. (U.S. Patent No. 5,932,896) is respectfully requested.

Claims 7, 8, 15 and 16 are rejected under 35 USC §103(a) as being unpatentable over Kunisato et al. (U.S. Patent No. 6,162,656) as applied to claims 1 and 11 above, and further in view of Hatakoshi et al. (U.S. Patent No. 6,031,5858).

Hatakoshi et al. describes a semiconductor laser having a sapphire substrate (10). In addition a GaN buffer layer (11) is shown with an n-type GaN contact layer (12), an n-type GaAlN cladding layer (13), an n-type GaN waveguide layer (14), an n-type GaAlN overflow blocking layer (15), an InGaN multi-quantum-well active layer (16), a p-type GaAlN overflow blocking layer (17), a p-type GaN waveguide layer (18) and a p-type GaAlN cladding layer (19).

Claims 7, 8, 15 and 16 are allowable by virtue of their dependence from allowable independent claims. Therefore, withdrawal of the rejection of Claims 7, 8, 15 and 16 under 35 USC §103(a) as being unpatentable over Kunisato et al. (U.S. Patent No. 6,162,656) and further in view of Hatakoshi et al. (U.S. Patent No. 6,031,5858) is respectfully requested.

Conclusion

In view of the aforementioned amendments and accompanying remarks, claims 1-4, 6-13 and 15-20, as amended, are believed to be in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS,
HANSON & BROOKS, LLP

George N. Stevens
Attorney for Applicant
Reg. No. 36,938

GNS/nrp
Atty. Docket No. **000351**
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930

23850
PATENT TRADEMARK OFFICE

H:\HOME\GSTEVENS\00\000351\Amendment